THE FARM GRASSES OF OHIO

OHIO

Agricultural Experiment Station

WOOSTER, OHIO, U. S. A., JANUARY, 1911.

BULLETIN 225

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BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 225 JANUARY, 1911

THE FARM GRASSES OF OHIO

BY C. G. WILLIAMS

The grass crop of Ohio, including both its meadows and pastures, is greater in area than all other crops combined. The best figures obtainable give the area in meadows, exclusive of pure clover, as upward of two million acres, and the area in pastures as near seven million acres. Much of the pasture acreage is rough and thin, and yields but a low return. The meadows of the state, however, compare favorably with other farm crops, as may be seen from the following table compiled from the Year Book of the U. S. Department of Agriculture for the year 1909.

TABLE I. ACREAGE, YIELD AND VALUE OF OHIO CROPS FOR 1909

Crop	Acreage	Tons or bushels	10-yr. av price	Value		10-yr. av, yield per acre
				Total	Per acre	
Hay	2,820,000	4,033,000	$ 10.06	$ 40,571,980	$ 14.39	1.38 tons
Corn....	3,875,000	153,062,000	0.48	73,469,760	18.96	35.6 bus.
Wheat....	1,480,000	23,532,000	0.86	20,237,520	13.67	14.9 bus.
Oats.....	1,730,000	56,225,000	0.36	20,241,000	11 70	33 2 bus.

The perennial grasses constitute some 70 or more percent of the hay crop of Ohio. While it is true that they have but a small place in intensive agriculture, the fact remains that there are extensive areas which, for various reasons, not the least of which is the lack of farm laborers, are likely, for some time to come, to be farmed in grass. These grasses are exceedingly useful in holding the soil. This is a service of value everywhere, but for some locations it means the salvation of the soil. Most of these grasses make good sods, which in turn make humus, and humus gives life to the soil.

The importance of the grass crop, both from a financial standpoint and from its relation to other agriculture, would suggest that it be given more careful attention than it ordinarily receives.

This Station has been testing the more common farm grasses, growing them side by side, for the past seven years. The results of these tests, together with brief cultural notes, follow:

TIMOTHY

Timothy (*Phleum pratense*) is a native of Europe having been brought to this country by the early colonists It takes its name from one Timothy Hanson who introduced it from England in 1720. Its success under cultivation in various parts of the new country led to its being carried back to England some thirty or forty years later, the new name going with it. The old name for this grass was Meadow catstail. It is doubtful whether it had been cultivated in England previous to this importation from the colonies.

Timothy is also known as Herd's grass in New England from the fact of its having been introduced in New Hampshire at an early day by John Herd.

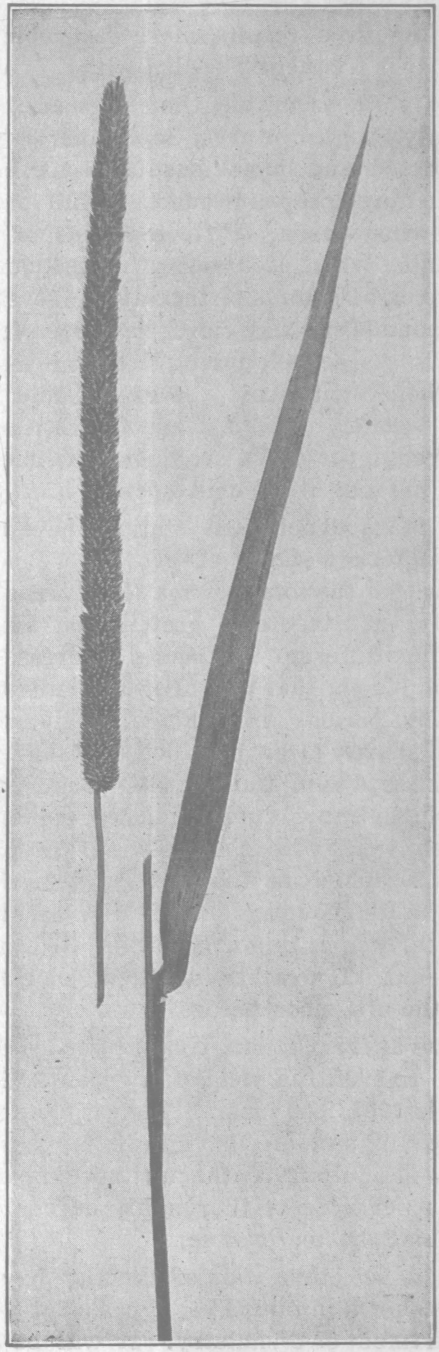
It is a hardy perennial, having erect stems, with a bulbous enlargement at the base of the stem. It is inclined to form tufts or stools, new stalks starting from the base of the original plant. In plant breeding work especially desirable plants are frequently multiplied by detaching and transplanting these bulbs.

Timothy is more generally cultivated in Ohio, and in the United States as a whole, than any other grass. Indeed, in so far as Ohio is concerned, probably more than all other grasses combined. It is adapted to a great variety of soils, though it does best upon rich, moist loams and clays. Upon light, sandy soils it is not as successful.

Timothy is distinctly a grass for hay rather than pasture. It may be used in pasture mixtures for early or temporary pasturage, but it will soon give place to the better sod-forming grasses, as it does not take kindly to close grazing and tramping. As a meadow grass, however, it stands at the head.

Rotation: Timothy is grown by many farmers in a four or five year rotation, being seeded with clover in wheat or oats. The first year of meadow,clover is the principal crop; the second year,timothy predominates. Near good city markets it is often grown year after year without reference to rotation, good yields being maintained by annual dressings of manure or other fertilizers. Timothy, like other sods, is valuable in maintaining the humus supply of the soil. Such sods are usually plowed for corn. Old sods are likely to be infested with insect pests and should be plowed if possible during freezing weather.

Seeding: Timothy is commonly seeded with wheat in the fall, clover being added in the spring. Under these conditions the timothy is likely to crowd the wheat if for any reason the latter does poorly. It does not give the clover as good a chance as when both



Timothy

are seeded together in the spring. Regardless of the other crops, however, fall seeding gives results more favorable to timothy than spring seeding It is frequently seeded with oats or barley.

There is no more favorable time to seed timothy or other grasses than in July, August or early September. To be successful, clean, well compacted and moist seedbeds are essential. Under such conditions no nurse crop is needed. A full crop of hay may be expected the following season. Fifteen pounds of timothy may be counted a full seeding when used alone. When clover is used with the timothy, six to eight pounds of the latter, seven pounds of red clover and three pounds of alsike clover have been found satisfactory at this Station. Unless seeded during freezing weather when the ground is cracked open with frost, the seed should be covered with a light harrow or weeder. When seeded with wheat or oats it can be distributed through the grass seeding attachment of the grain drill and dropped in front of the drill hoes.

Harvesting: Many experiment stations have tested the value of timothy cut at different stages of growth. Briefly summarized these results show that the total dry matter increases until the seed is close to maturity; that the total protein and fat, as well as the digestibility of the different nutrients decrease slightly after timothy passes full bloom; that the fiber and nitrogen-free extract increase during this period. All things considered timothy may safely be left until shortly after the blossoms have fallen, but not later than when the seed is in the dough. Comparatively late harvesting is favorable to rapid curing and consequently lessens the danger of loss from rain, with the alternate dissolving of soluble feed elements and bleaching in the sun, so destructive to quality and palatability. With good weather and the use of the hay tedder, there is little difficulty in curing and storing timothy in the barn or stack the day it is cut. If weather is settled, some time is saved by mowing it late in the afternoon before.

Yield: In tests at this Station, timothy has led all other grasses in yield per acre. In 1905, the yield of hay was 2.92 tons per acre; in 1906, 2.62 tons; in 1907, 3.60 tons. The test plots were plowed up in 1908 and new seedings of all the different grasses tested were made July 1, 1909. In July, 1910, the new seeding of timothy gave a yield of 4.85 tons per acre of thoroughly cured hay. The four year average yield is 3.497 tons per acre.

Composition: The composition of timothy hay as grown upon the Station farm is shown in table IV. These determinations were made by the Department of Chemistry. It will be noted that the

percentage of protein is lower in timothy than in the other grasses. The percentage of fat, however, is the highest of any of the grasses. The food value per acre is shown in the same table.

The popularity of timothy among Ohio farmers is easily accounted for. It lies in its good yield; in its palatability; in the ease and cheapness with which it is harvested; in the great demand at good prices for timothy hay; in the moderate expense of seeding an acre to timothy; in the good germination of seed and the relative certainty of securing a stand, and in its longevity when properly cared for. With annual dressings of manure or, in the absence of manure, of nitrate of soda supplemented with acid phosphate and muriate of potash, and, when needed, lime, timothy may be made to give good yields of hay indefinitely. Ordinarily this would not be desirable, but under certain conditions it is admissible.

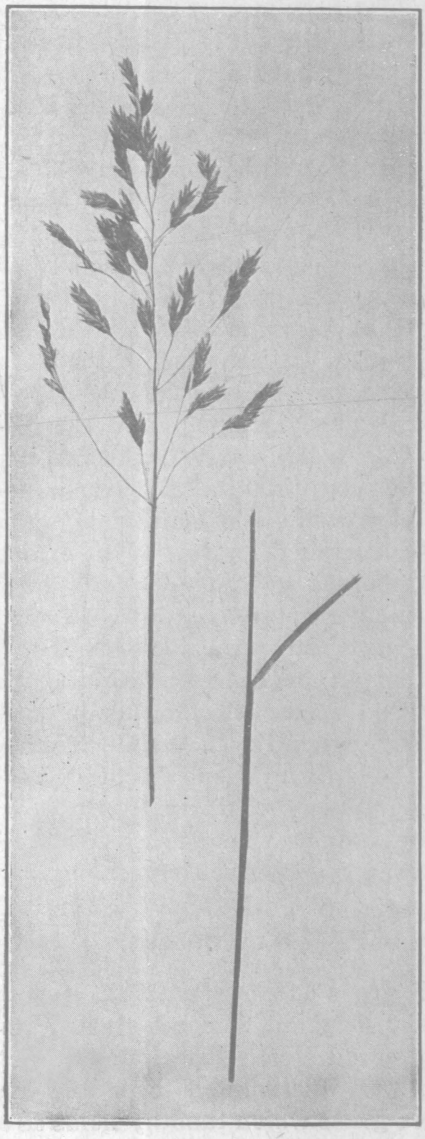
Disadvantages: In common with all the grasses timothy is lacking in ability to utilize the nitrogen of the atmosphere through the aid of such micro-organisms as cooperate with clover and other legumes, and is consequently a much more exhaustive crop on land than clover. While timothy cannot take the place of clover in a rotation, it should be recognized that the grasses leave crop residues in the way of sods of great value in maintaining the supply of humus.

In so far as furnishing a crop of aftermath is concerned, timothy can not be counted upon to do very much, of an average season. Only in case of exceptional rainfall during July and August may a second crop worth harvesting be expected.

The Production of Seed: As a seed producer timothy is usually to be depended upon. The yields seldom drop below five bushels per acre and frequently reach ten or twelve bushels. It can be harvested with the ordinary farm machinery. It is cut with a grain binder; at once put in shock "two by two", without caps, and allowed to cure about a week, when it may be threshed with a common grain separator, using special sieves.

BLUE GRASS

Kentucky blue grass (*Poa pratensis*), very commonly called June grass, and in England, smooth-stalked meadow grass, is native to both Europe and North America. It is a hardy and persistent perennial well distributed over the state, holding the position as a pasture grass which timothy holds as a grass for hay. It makes the best sod of any of our grasses and tends to crowd other grasses out when land is left any considerable time in grass, particularly if it be pastured.



Blue grass

Soil: It is at its best on the limestone soils of the state, though it does fairly well on a wide range of soils in the timothy and clover region. It does better on clay than on sandy loams. Being a shallow-rooted plant it gives way quickly to droughty conditions, though it will start up immediately after good rains.

Blue grass is not well adapted to rotation farming. It is seldom used for hay, though it makes a very nutritious hay as will be seen by refering to Table IV. Unless it is harvested promptly it inclines to be wiry and loses in palatability.

It is both an early spring and a late fall grower, furnishing excellent pasture at both ends of the season. Its short season is in midsummer, particularly if the weather be dry. It stands grazing and tramping well, but it is a mistake to graze it too close.

Seeding: Blue grass may be seeded with wheat in the fall, or in early spring along with other grasses and clover, but probably the best time to seed it is in the late summer or early fall, either alone, or with other grasses. Ordinarily there is difficulty in securing an immediate stand of blue grass. This is due in part to the very general poor germination of blue grass seed. When only a small percent of the seed germinates it must needs take time for blue grass to make its way. With good seed sown under favorable conditions blue grass will take possession of the ground quite rapidly, though not as rapidly as many grasses. A seeding made by this Station July 1, 1909, cut 2.86 tons of well cured hay June 20, 1910. The sod now fifteen months after seeding is very dense. This seeding was at the rate of 25 pounds per acre.

It is important that grass seed be tested for germination before purchases are made. If this be done there will be fewer purchases.

As blue grass seed runs, it probably is as well to seed other grasses with it. This reduces the chances of failure and insures an immediate crop. The blue grass will eventually come into possession of the ground. A mixture of blue grass, timothy, redtop and orchard grass seeded in the late summer or fall, followed in the early spring with seedings of red and alsike clover, will be found satisfactory. If the seeding be made early it will not be amiss to sow the clovers with the grasses. For the amount of seed recommended of the several constituents see a later page on the care of pastures.

When seeded alone, 25 or 30 pounds of blue grass should be used per acre.

Yield of Hay: This Station has secured a four year average yield of 2.187 tons of hay per acre. The lowest yield during the four years was 1.56 tons and the highest 2.86 tons. As grasses go this is not a bad showing.

The seed production of blue grass is largely confined to a small area in Kentucky. Special machinery is used for "stripping" the heads, as also for cleaning the seed.

For Lawns: Blue grass is the basis of all lawn grass mixtures. It stands frequent clipping admirably. Its one weakness is its habit of turning brown in dry weather, but when water can be supplied it leaves little to be desired. It is well to mix redtop and a little white clover with it, however. A mixture of 30 pounds of blue-grass, 15 pounds of redtop and 3 pounds of white clover per acre. makes a good seeding.

REDTOP

Redtop (*Agrostis alba*) belongs to a family of grasses very generally distributed over the globe. While probably second in Ohio to timothy, as a grass for hay, and to blue-grass for pasture, it is not a close second in either case. It is a hardy and a long-lived grass, making a heavy, tough sod which stands tramping well.

It is about equally valuable for hay and pasture. It is a little later in season than timothy but may be seeded with it in so far as harvesting is concerned, though where hay is intended for market this practice can hardly be advised for redtop is not in as good market demand as timothy.

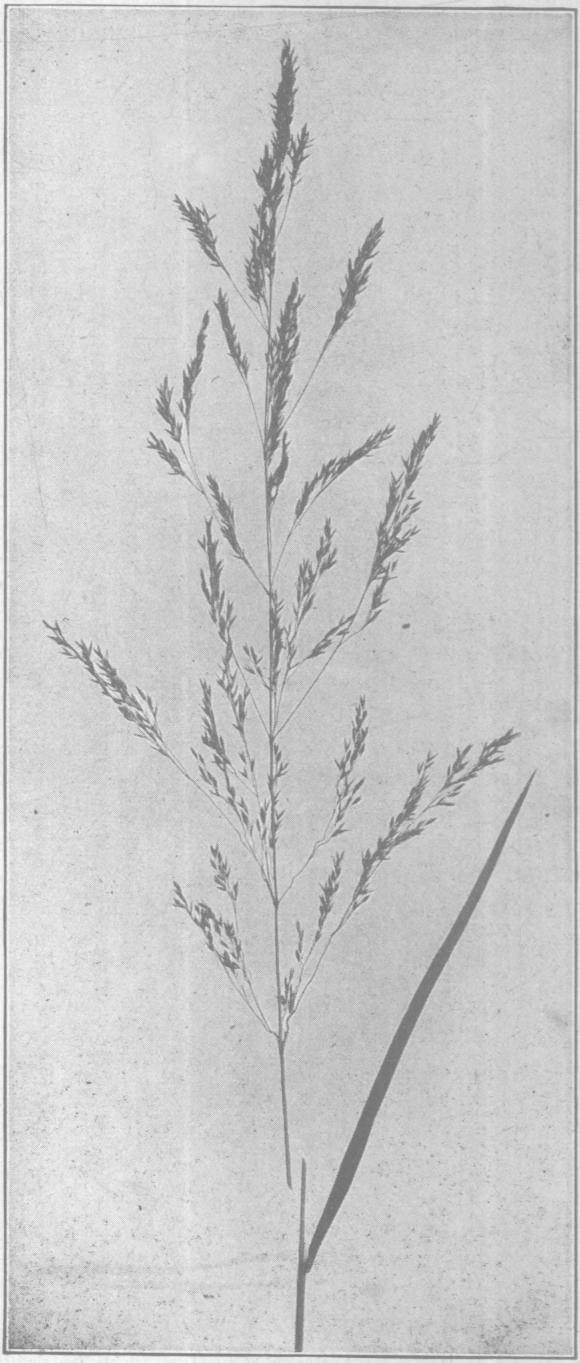
Soil: Redtop is very generally found growing wild on wet, heavy bottom lands, and should always be included in mixtures for such lands whether for hay or pasture. It will do well on soil that is too acid for clover or timothy to thrive. While better adapted to wet lands it may be expected to do fairly well on a great variety of soils.

Seeding: Redtop seed varies rather more in quality than other grasses. Quotations at hand from a single seedsman vary in price from $4.00 to $16.50 per cwt., owing to grade. The best recleaned seed is the cheapest. Fancy grades weigh from 30 to 40 pounds per bushel.

Of the best grade of seed 15 pounds per acre may be counted a full seeding, when used alone.

It may be seeded as has been recommended for timothy and blue grass.

Land which for any reason cannot well be prepared for seeding may be seeded in February or March, the seed being covered by freezing and thawing. Thin or recently cleared woodlands may be set in grass in this way. Also wet lands with inferior herbage may be improved by such seeding. Fowl meadow grass (*Poa flava*), sometimes called false redtop, may well be mixed with redtop for the latter conditions.



Redtop

For the sake of variety and season, redtop should be included in all pasture mixtures.

Yield as Hay: As tested at this Station for yield of hay redtop has given a four year average yield of 2.817 tons per acre. It accordingly stands second of the eight grasses tested this length of time. It is exceeded in yield by timothy only.

ORCHARD GRASS

Orchard grass (*Dactylis glomerata*) is a native of Europe, going by the name of cocksfoot in England. Its American name is due to its successful and persistent growth in partially shaded places.

This grass has but a small place in Ohio agriculture. In two counties, Clinton and Highland, it is grown extensively as a seed crop, but is not extending very far over their borders. The price of orchard grass seed is usually quite high and the returns per acre fairly remunerative; but this matter of seed production could easily be overdone, as the demand is limited.

Orchard grass is about equally valuable for hay or pasture. It calls for a drier soil than redtop. It does best on rich, well drained loams.

Its Advantages are: It stands drought much better than timothy and blue-grass. It is one of the first grasses to start in the spring, offering the first bite of the season in pastures. It makes a more rapid growth after mowing than most grasses, furnishing considerable aftermath for pasturage and, some seasons, a fair second cutting. It is very persistent. The writer knows of patches seeded 35 years ago that seem not to have changed any during the last 25 years.

Its Disadvantages are: Unless kept closely cropped in pastures it is likely to be avoided by livestock, as it seems to lose in palatability with size and age. Unless cut for hay promptly (when in blossom) it rapidly deteriorates, becoming very woody. In this woody stage it is not relished by stock. On this account its harvest season cannot be extended like timothy. The tendency to grow in tufts is much greater with orchard grass than with other grasses. It is very difficult, if not impossible, to secure an even sod. It costs about three times as much to seed an acre to orchard grass as to timothy. On the average, at this Station, timothy has exceeded orchard grass in yield of hay about 60 percent. The market for timothy hay is established and the price is at the top; neither of which is true of orchard grass.

Seeding: Orchard grass may be seeded on wheat ground in the early spring and the covering left to the freezing and thawing of the ground, but perhaps a better way is to wait until ground is dry

Orchard grass

enough to put a smoothing harrow on it, thus insuring a better covering, as this seed will not drop into the ground as readily as timothy and clover. It is sometimes seeded with wheat in the fall. Like other perennial grasses it is found very satisfactory to seed it in midsummer or early fall, alone or with other grasses.

The purity and germination of commercial samples of orchard grass are usually good. When seeded alone either for hay or pasture it is well to use about 30 pounds of seed per acre. For growing a seed crop less seed is used—12 to 20 pounds.

Since orchard grass is of the same season as red clover it is often recommended to seed the two together. That this mixture will produce any more or any better hay than mixtures of timothy and clover, is to be doubted, even though the latter are not of the same season. The Illinois Station* found a mixture of 9 pounds of timothy and 6 pounds of clover to yield 18 percent more hay, as an average of two years' tests, than 17½ pounds of orchard grass with the same amount of clover seed.

If orchard grass has a place in Ohio as a hay crop it is in locations where timothy is not at its best—in partially shaded places, for instance. It is worthy of trial, in a small way, in pasture mixtures

Seed Production: In the seed producing sections orchard grass is allowed to stand until it begins to shatter slightly, when it is cut with a grain binder, as high as possible. It is allowed to stand in small shocks 2 or 3 weeks, when it is threshed with an ordinary grain separator. It yields from 8 to 16 bushels of seed per acre. The aftermath is used for pasture or hay. The straw also has a little value.

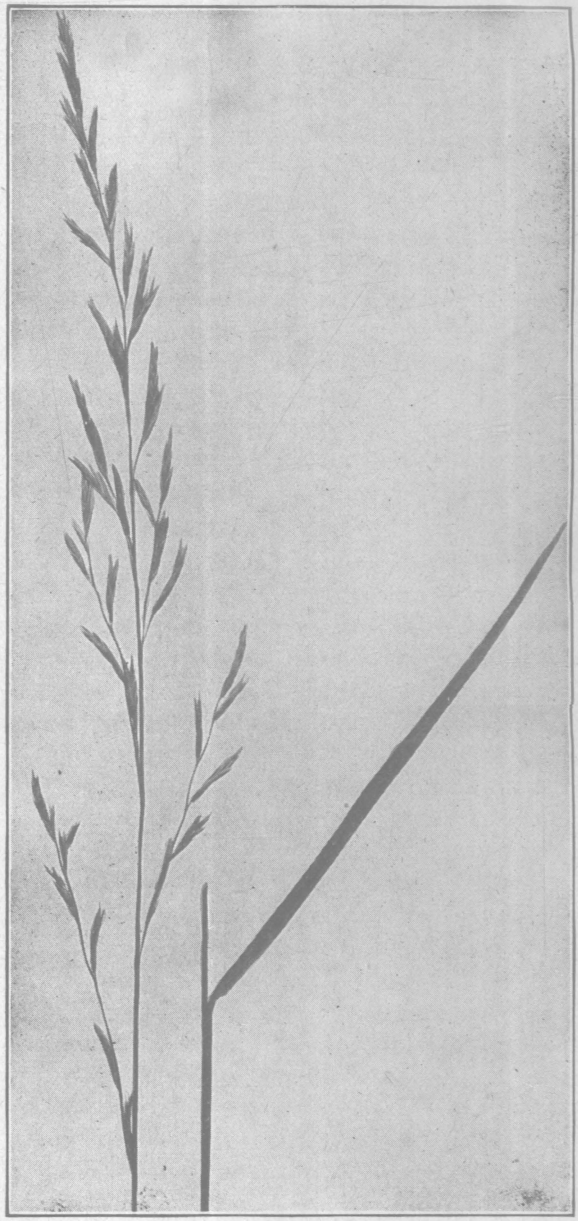
Yield of Hay: The four year average yield of hay at this Station has been 2.197 tons per acre.

MEADOW FESCUE

Meadow fescue (*Festuca pratensis*) is a native of Europe and is very extensively cultivated in England. It is seldom seeded in Ohio, but in some way it has become quite well distributed over the state along road sides and, to some extent, in the richer and more moist portions of permanent pastures. This suggests its adaptability to certain Ohio conditions and is perhaps its chief recommendation.

In the timothy region there can be but little place for it as a hay. It is far below timothy in yield and unless it be cut promptly is inclined to be tough and wiry. When harvested properly it makes a palatable hay.

*Bul. 15, p 486.



Meadow fescue

It is doubtless better as a pasture grass, though it is not well enough tested yet to justify its unqualified recommendation. One great objection to it is the high price of the seed. A full seeding calls for about 30 pounds per acre. At present prices this will cost double what it will to seed to a mixture of blue-grass, timothy and redtop, and, as tested at the Cornell Experiment Station,* the latter mixture will prove the more valuable.

TALL FESCUE

Tall fescue (*Festuca elatior*) is another member of the Festuca family of which there are some eighty species. This grows four to eight inches taller than the meadow fescue and is somewhat more vigorous. The seed of the tall fescue comes still higher in price. In yield of hay it is superior to meadow fescue. In quality they are about the same.

At this Station the four year average yield of tall fescue is 2.435 tons per acre, while the average yield of meadow fescue is 2.10 tons. Each year of the four, the tall fescue has led in yield.

BROME GRASS

Brome grass (*Bromus inermis*), frequently called awnless brome grass and Russian brome grass, is a native of Europe, having been grown upon the cold, dry Steppes of Russia for centuries. As compared with other grasses it is a recent introduction in this country. It is proving a great acquisition in the northwest and parts of the west. Its value for Ohio conditions remains to be proved.

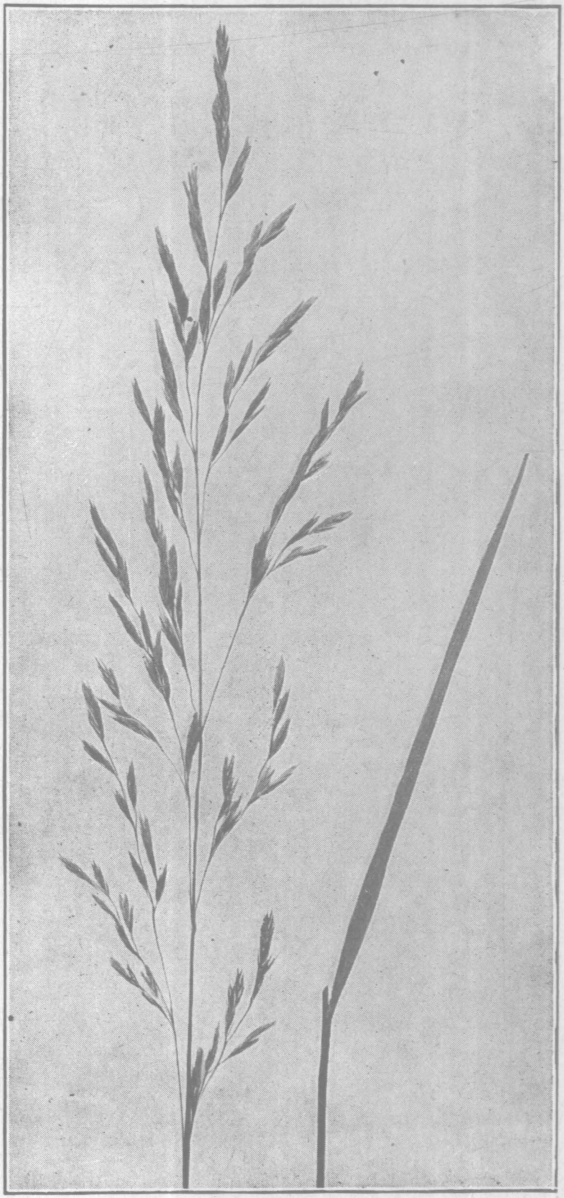
Brome grass is in greater repute as a pasture than as a hay grass. It has a very deep and an abundant root system which fortifies it against drought.

The Ohio Station has been quite unfortunate in its seedings of brome grass. Owing to poor germination of seed, in part, it has failed upon repeated seedings. A seeding made in 1909 was the first to give a fair result.

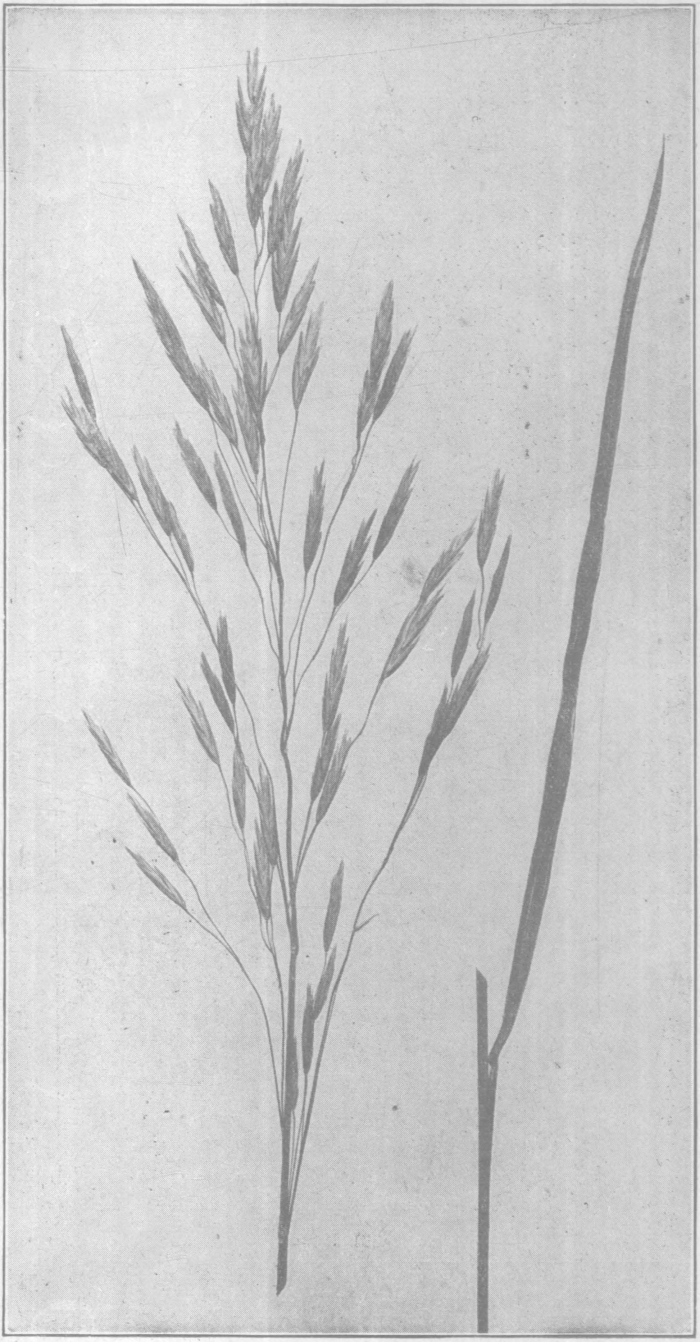
The Cornell Station† reports a failure after three different seedings, and a lack of adaptability to New York conditions.

Seeding: Twenty pounds of seed per acre is quite commonly recommended for this grass. All things considered it would seem to be far short of a full seeding. The seed of brome grass is very large. It runs about 140,000 seeds per pound, while blue-grass has some 2,500,000, and redtop 6,000,000 per pound. Forty pounds of brome grass seed per acre will come nearer a full seeding for Ohio conditions. The seed is moderate in price.

*Bul 280, p 378
†Bul 280, p 379



Tall fescue



Brome grass

Yield: The only year this Station has succeeded in getting a crop of brome grass was in 1910. The yield of hay was 2.98 tons. The same season timothy gave a yield of 4.85 tons; redtop 3.34 tons tall fescue 3.02 tons and blue grass 2.86 tons per acre.

Brome hay is nutritious and palatable.

TALL OAT GRASS

Tall oat grass (*Arrhenatherum elatius*) is a European perennial grass, little cultivated in this country. There would seem to be small, if any place for it in this state, save possibly on light, sandy soils where better grasses will not thrive. It is a deep-rooted grass and stands drought well.

In point of season tall oat grass ripens with orchard grass, or a little earlier. Like orchard grass it deteriorates rapidly after it is ready for harvest. It ripens seed quickly and shatters badly. It starts growth very early in the spring and produces a great deal of aftermath when cut for hay.

In palatability it is subject to great criticism. As grown at this Station it has shown quite a tendency to smut. The yield of hay has been fairly good, the four year average yield being 2.247 tons per acre. Only once in the four years has the yield dropped below two tons.

THE RYE GRASSES

Perennial rye grass (*Lolium perenne*) is a native of Europe. It is a great favorite in England and perhaps the most important grass of Europe. It is valued very highly as a pasture grass and is used to quite an extent for hay also, though it is preeminently a pasture grass.

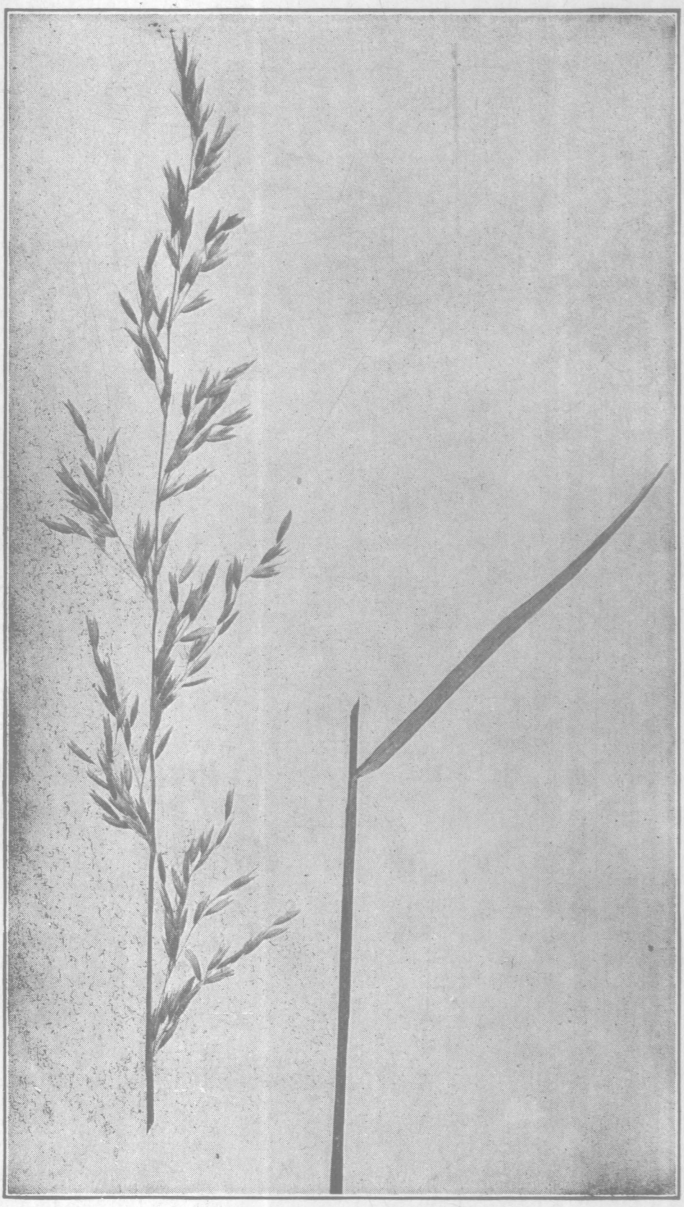
In the United States it has never gained a prominent position and is practically unknown in Ohio.

It is frequently recommended as a minor ingredient of pasture mixtures but it will hardly make headway in competition with blue grass, redtop, timothy and orchard grass. Used in mixtures of ten different grasses at the Cornell Station, it "has not been observed at all."

It is better adapted to rich, moist soils than to other types. Thirty pounds of seed per acre is needed, when seeded alone. The seed of perennial rye grass is very cheap.

Yield: In our tests of ten grasses, perennial rye stands lowest in yield of hay, the four year average being only 1.82 tons per acre.

It can hardly be recommended for Ohio conditions.



Tall oat grass

Perennial rye grass

ITALIAN RYE GRASS

Italian rye grass (*Lolium italicum*) is a biennial. Under some conditions it will perpetuate itself by reseeding, but it cannot be counted upon to do so.

It is a very rapid grower. Compared with the perennial rye grass, the Italian rye is of a lighter shade of green, grows more rapidly, is earlier, has coarser stems, and is taller. The seed may be distinguished from the fact that the Italian rye has a small beard, while the perennial does not.

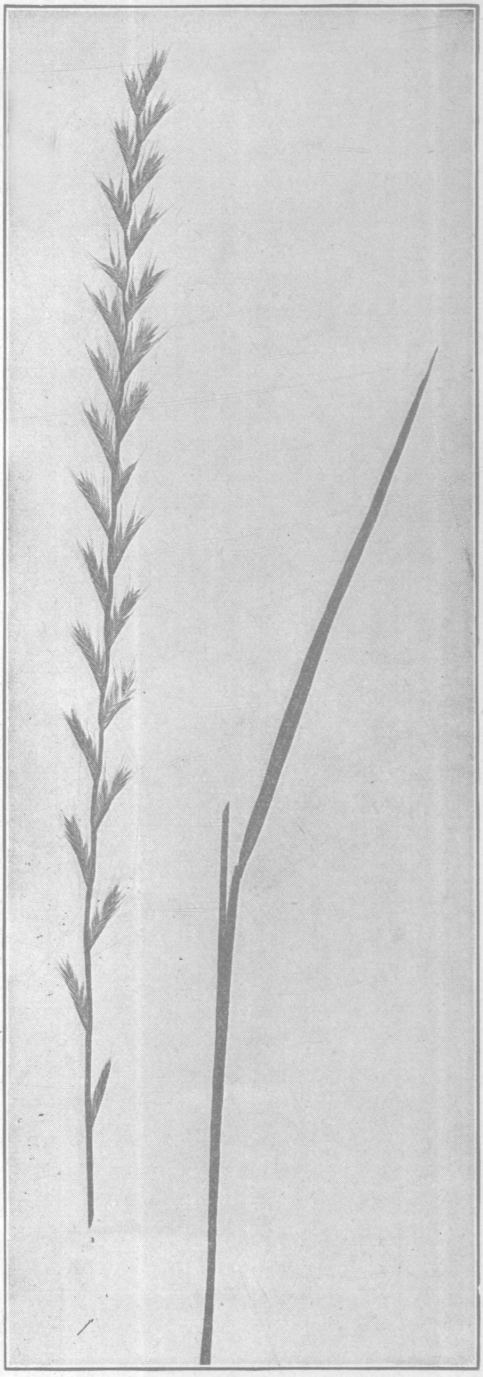
The Italian rye grass is not adapted to pasturing, as it is too short-lived. Its greatest success seems to be under irrigation. It is frequently used to seed lawns for the reason of the quick covering of green it furnishes, though it is of no value as a permanent lawn grass. For field conditions 35 pounds of seed per acre are required.

Yield: This Station has had it in its large plot tests but one season, when it gave a yield of 2.56 tons per acre, standing seventh among ten other grasses.

A FURTHER WORD ON PASTURES

In addition to what has been said about pastures under blue grass and other grasses, attention should be called to the desirability of mowing pastures over once during July or August. Not simply clipping a little here and there with a scythe, but a thorough going over with a mowing machine. In some pastures this will necessitate a great deal of grubbing and cleaning up, which in itself will mean more and better grass. This mowing prevents the weeds, which usually are not cropped back by the livestock, from taking moisture greatly needed by the grass, thereby weakening and gradually crowding the grass out. And, if the mowing be done at the proper time, it greatly reduces the future crop of weeds by the prevention of seeding, and also destroys many weeds outright by cutting them off at a critical stage. The mowing machine should be set to run moderately high. It will be found a very useful implement in pasture fields.

Furthermore, pastures should be systematically fed. In the absence of applications of manure or fertilizers, lands kept in permanent pasture may be expected to decline. The production and removal of bone, flesh, wool, milk, etc., can but reduce the stock of plant food in the soil. If the product of our pastures is to be increased, or even maintained, there must be a restoration of the plant food removed, as may be needed; particularly of the phosphorus, and frequently on the thinner soils, of nitrogen, potassium and lime. A dressing of stable manure is valuable, but seldom is it available. Usually it is necessary to resort to the use of commercial



Italian rye grass

fertilizers. Applications of 200 pounds of steamed bone and 30 to 40 pounds of muriate of potash per acre are helpful. Off the limestone, occasional dressings of fine ground limestone (1 to 2 tons per acre) may be expected to be needed. It will be better to let several months intervene, if possible, between the application of limestone and manure.

After treating as above suggested, a heavy spike-tooth harrow can often be used with profit, and also additional grass and clover seed.

Grass Mixtures—For ordinary conditions, the following mixture is suggested for an acre of ground:

Blue grass	10 pounds	Orchard grass	4 pounds
Timothy	6 "	Red clover	4 "
Redtop	6 "	Alsike clover	2 "

For use on rather wet soils, and especially off the limestone:

Redtop	12 pounds	Timothy	4 pounds
Blue grass	8 "	Alsike clover	4 "

THE COMPARATIVE COST OF SEEDING DIFFERENT GRASSES

In Table II is given the comparative cost of seeding an acre of land to the different grasses reported upon in this bulletin. The amount of seed indicated per acre is believed to be none too much for a good stand of plants, when using the best grades of commercial seed. The price of seed is from recent quotations from our best seed houses. The price varies with production. Timothy, for instance, is very high this season. It may be worth only one-half as much in twelve months.

It will be noted that the variation in the expense of seeding an acre to the different grasses is very great. This will have to be taken into consideration in determining their utility.

TABLE II. THE COST OF GRASS SEED PER ACRE

Name	Lbs. per acre	Cost per lb. cents	Cost per acre
Timothy	15	12	$ 1.80
Blue grass	25	22	5.50
Redtop	15	16	2.40
Orchard grass	30	18	5.40
Meadow fescue	30	25	7.50
Tall fescue	30	27	8.10
Brome grass	40	8	3.20
Tall oat grass	30	17	5.10
Perennial rye grass	30	6	1.80
Italian rye grass	35	6½	2.28

THE COMPARATIVE YIELD OF GRASSES

Seedings of nine different grasses were made in 1904. Size of plots, one-twentieth of an acre. Good stands were secured of all save brome grass. This plot was a failure. It bore a variety of grasses and weeds, but very little brome grass. Three successive crops of hay of the several grasses were harvested, when the plots were plowed up, cleaned, manured, limed and reseeded in 1909. In the reseeding, Italian rye grass was added.

The yield for the four harvests follow:

TABLE III. YIELD OF GRASSES

Name	Tons of hay per acre				
	1905	1906	1907	1910	4 yr. av.
Timothy	2.92	2.62	3 60	4 85	3 497
Blue grass	1.56	2.18	2.15	2.86	2.187
Redtop	2.75	2.96	2.22	3.34	2.817
Orchard grass	1.65	2.34	2.22	2.58	2.197
Meadow fescue	1.85	2.10	2.01	2 44	2.100
Tall fescue	1.95	2.18	2.59	3.02	2.435
Brome grass	1.45*	.....	2.74*	2.98	.....
Tall oat grass	1 75	2.40	2.32	2.52	2.247
Perennial rye grass	1 72	1.70	2.11	1.76	1.822
Italian rye grass	.....	.....	.....	2.56	.....

*Almost everything in this except brome grass.

COMPOSITION OF OHIO GRASSES

The hay made from different grasses in 1910 was analyzed by the Department of Chemistry, to whom the writer acknowledges his indebtedness. Table IV gives the percentage composition and the pounds of the different constitutions per acre, using the four year average yield as the basis. The superiority of the old-time favorites is apparent.

TABLE IV. COMPOSITION OF OHIO GRASSES

Name	Pounds per hundred						Pounds per acre			
	Water	Ash	Protein	Fiber	N-free extract	Fat	Protein	Fiber	N-free extract	Fat
Timothy	2 93	5.00	6.38	37.90	45 17	2.62	446.2	2,650.8	3,159.2	183 2
Blue grass	6.22	5 62	10.12	32 27	43.51	2.26	442.6	1,411.5	1,903.1	98.9
Redtop	2.28	6.52	8.53	33 91	46 45	2.31	480.6	1,910.5	2,617.0	130.1
Orchard grass	5 58	6.98	7.81	35.45	41 88	2.30	343.2	1,557.7	1,840.2	101.1
Meadow fescue	4.96	6.70	8.97	34.94	42.11	2.32	376.7	1,467.5	1,768.6	97.4
Tall fescue	6 88	6.02	8.81	35 66	40.72	1 91	429.0	1,736 6	1,983.1	93.0
Brome grass	4.83	6.18	9 25	35 71	41.97	2.06	*			
Tall oat grass	5 42	6.11	7.81	35.13	43.67	1 86	351.0	1,578.7	1,962.5	83.6
Perennial rye grass	5.75	7.29	7.59	32.89	44 67	1 81	276.6	1,198.5	1,627.8	66.0
Italian rye grass	4.79	7.03	6.59	32.70	46.90	1.99	*			

*Omitted in absence of four-year records.